CLAIMS

We claim:

1. An impeller for a regenerative turbine pump, said impeller comprising:

(a) a hub defining an aperture at a center thereof into which a shaft of said turbine pump is securable to allow said hub to rotate about a center axis therewith;

(b) an outer ring concentric to said hub; and

(c) a plurality of vanes extending from an outer surface of said hub to an inner surface of said outer ring with each said vane comprising an entrance portion that extends from said outer surface and an exit portion that extends from said entrance portion to said inner surface, each of said vanes (i) having a V-shape of a prespecified angle centered relative to a plane normal to said center axis and (ii) being at least partially non-linear on at least one of an upstream face and downstream face of said vane from said entrance portion thereof through said exit portion thereof, said entrance and said exit portions of each said vane each having a pair of outer sidewalls, each of said outer sidewalls of each said entrance portion being chamfered along a trailing corner thereof at a predetermined angle relative to said plane.

2. The impeller claimed in claim 1 wherein each of said outer sidewalls of each said exit portion are chamfered along a trailing corner thereof at said predetermined angle relative to said plane.

3. The impeller claimed in claim 1 wherein said predetermined angle relative to said plane is substantially equal to an angle at which a fuel stream within said turbine pump approaches said outer sidewalls of said entrance portions.

4. The impeller claimed in claim 1 wherein said predetermined angle lies within a range of 15° to 45° relative to said plane.

5. The impeller claimed in claim 4 wherein said predetermined angle is 30° relative to said plane.

6. The impeller claimed in claim 1 wherein said prespecified angle lies within a range of 50° and 130° for said upstream face of said vane.

7. The impeller claimed in claim 6 wherein said prespecified angle is 90° for said upstream face of said vane.

8. The impeller claimed in claim 1 wherein said prespecified angle lies within a range of 80° and 86° for said downstream face of said vane.

9. The impeller claimed in claim 8 wherein said prespecified angle is 82.3° for said downstream face of said vane.

10. The impeller claimed in claim 1 wherein said aperture defined in said hub is notched to permit said impeller to be securely fitted onto said shaft of like shape.

11. An impeller for a regenerative turbine pump, said impeller comprising:

(a) a hub defining an aperture at a center thereof into which a shaft of said turbine pump is securable to allow said hub to rotate about a center axis therewith;

(b) an outer ring concentric to said hub; and

(c) a plurality of vanes extending from an outer surface of said hub to an inner surface of said outer ring with each said vane comprising an entrance portion that extends linearly outward from said outer surface and an exit portion that extends

linearly from said entrance portion to said inner surface, each of said vanes having a V-shape of a prespecified angle centered relative to a plane normal to said center axis with said exit portion thereof being inclined forward of said entrance portion so as to advance toward said inner surface of said outer ring at an exit angle with respect to a direction of rotation of said impeller, said entrance and said exit portions each having a pair of outer sidewalls, each of said outer sidewalls of each said entrance portion being chamfered along a trailing corner thereof at a predetermined angle relative to said plane.

12. The impeller claimed in claim 11 wherein each of said outer sidewalls of each said exit portion are chamfered along a trailing corner thereof at said predetermined angle relative to said plane.

13. The impeller claimed in claim 11 wherein said predetermined angle relative to said plane is substantially equal to an angle at which a fuel stream within said turbine pump approaches said outer sidewalls of said entrance portions.

14. The impeller claimed in claim 11 wherein said predetermined angle lies within a range of 15° to 45° relative to said plane.

15. The impeller claimed in claim 14 wherein said predetermined angle is 30° relative to said plane.

16. The impeller claimed in claim 11 wherein said prespecified angle lies within a range of 50° and 130° for said upstream face of said vane.

17. The impeller claimed in claim 16 wherein said prespecified angle is 90° for said upstream face of said vane.

18. The impeller claimed in claim 11 wherein said prespecified angle lies within a range of 80° and 86° for said downstream face of said vane.

19. The impeller claimed in claim 18 wherein said prespecified angle is 82.3° for said downstream face of said vane.

20. The impeller claimed in claim 11 wherein said exit angle lies within a range of 15° to 50°.

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21. An impeller for a regenerative turbine pump, said impeller comprising:

(a) a hub defining an aperture at a center thereof into which a shaft of said turbine pump is securable to allow said hub to rotate about a center axis therewith;

(b) an outer ring concentric to said hub; and

(c) a plurality of vanes extending from an outer surface of said hub to an inner surface of said outer ring with each said vane comprising an entrance portion that extends from said outer surface and an exit portion that extends from said entrance portion to said inner surface, each of said vanes having a V-shape of a prespecified angle centered relative to a plane normal to said center axis and being curved with said entrance portion drawing away from said outer surface at an entrance angle with respect to a direction of rotation of said impeller and said exit portion advancing toward said inner surface at an exit angle with respect to said direction of rotation, said entrance and said exit portions each having a pair of outer sidewalls, each of said outer sidewalls of each

said entrance portion being chamfered along a trailing corner thereof at a predetermined angle relative to said plane.

22. The impeller claimed in claim 21 wherein each of said outer sidewalls of each said exit portion are chamfered along a trailing corner thereof at said predetermined angle relative to said plane.

23. The impeller claimed in claim 21 wherein said predetermined angle relative to said plane is substantially equal to an angle at which a fuel stream within said turbine pump approaches said outer sidewalls of said entrance portions.

24. The impeller claimed in claim 21 wherein said predetermined angle lies within a range of 15° to 45° relative to said plane.

25. The impeller claimed in claim 24 wherein said predetermined angle is 30° relative to said plane.

26. The impeller claimed in claim 21 wherein said prespecified angle lies within a range of 50° and 130° for said upstream face of said vane.

27. The impeller claimed in claim 26 wherein said prespecified angle is 90° for said upstream face of said vane.

28. The impeller claimed in claim 21 wherein said prespecified angle lies within a range of 80° and 86° for said downstream face of said vane.

29. The impeller claimed in claim 28 wherein said prespecified angle is 82.3° for said downstream face of said vane.

30. The impeller claimed in claim 21 wherein said entrance angle lies within a range of 5° to 30° and said exit angle lies within a range of 15° to 50°.

31. The impeller claimed in claim 21 wherein a tangent drawn at a center portion of said vane is normal to said direction of rotation.